vited by the Education Sub-Committee of the Royal Commission for the Paris Exhibition of 1900 to co-operate in the work of securing for the exhibition an adequate and comprehensive representation of all grades of educational effort, public and private, in the United Kingdom, and Sir Owen Roberts has been appointed by the Executive Committee to attend the conferences convened by the Chairman, Sir George Kekewich, K.C.B., to consider the arrangements for the educational section.

SCIENTIFIC SERIALS.

American Journal of Science, April.—Glacial Lakes Newberry, Warren, and Dana in Central New York, by H. L. Fairchild. The ice sheet of the last glacial epoch covered all the area of the Great Lakes. When the receding front of the glacier had passed to northward of the southern boundary of the Laurentian basin, the glacial and meteoric waters were impounded between the ice front and the north-sloping land surface. These glacial lakes had their outlets southward across the divide, and they expanded northward as the barrier of ice receded. The author describes the succession of events in the life and extinction of the later and broader glacial waters in the critical district of the Finger Lakes.—Rapid method for the determination of the amount of soluble mineral matter in a soil, by T. H. Means. This method is an electrical one. The sample is treated with distilled water and the specific resistance of the solution is determined. Two men can thus examine from sixty to one hundred samples of soil in a day, and salt maps of irrigated and other districts may be rapidly constructed.—New type of telescope objective specially adapted for spectroscopic use, by C. S. Hastings. The author has constructed an objective consisting of a quadruple combination of silicate flint, borosilicate flint, silicate crown, and barium crown which is absolutely colour-free, and equally adapted to photographic and to eye observations. From the lines A to K, the focal plane for all rays is rigidly the same. There are only two free surfaces, the four lenses being cemented together.—On the phenocrysts of intrusive igneous rocks, by L. V. Pirsson. Not all phenocrysts are intratelluric in the sense that they have been formed at much greater depths than they now occur in. On the contrary, in many cases they have been formed in place, and are of contemporaneous origin with the other constituents of the rocks.—The occurrence, origin, and chemical composition of chromite, by J. H. Pratt. The author has been led to adopt the theory that the chromite occurring in the peridotite rocks of North Carolina was formed at the same time as the peridotite, *i.e.* was held in solution by the molten mass of the peridotite and crystallised out among the first minerals as the mass began to cool.—Two species of Saurocephalus, by O. P. Hay. One of the species described, *S. lanciformis*, is little known. The other species is new. It has a slenderer head and a larger mouth than *S. dentatus*. The author names it *S. pamphagus*.

Correction.—The abstract of G. P. Starkweather's paper, *Am. J. Sc.* for February, should read: The writer adduces evidence from Regnault's own experiments to show that his calorimeter temperatures were reduced to the air thermometer, a fact questioned by Bosscha and others.

Symons's Monthly Meteorological Magazine, April.—Winter minima on British mountain tops. In 1867, the late Mr. H. B. Biden placed a minimum thermometer on the Glyder fach, about four miles E.N.E. of Snowdon, at an altitude of 3262 feet. The thermometer was placed beneath a protecting slab of feldspar porphyry, and left to its fate, being read each spring, and then reset. Mr. W. Piffe Brown has discussed the temperatutes in the *Climbers' Club Journal* for February last. The average for the years 1884–96 except 1894–95, when the record was lost) was 14°·7, the absolute minimum being 8°, in the winter of 1893–94. The accumulation of snow may account for the readings not being lower, but it is improbable that there was always snow there at times of severe cold. At Ben Nevis, the average of the minima for the same period is 7°·5, the absolute minimum being 0°·7 in January 1894. A very contradictory record was obtained by the late Dr. J. F. Miller at Scaw Fell, where the wonderful temperature of −31° was recorded for January and February 1850.—Negretti and Zambra's self-recording rain gauge. Mr. Symons states that this is a very simple and efficient instrument; the rain collected by the receiver falls into the upper half of the vibrating bucket (designed by Sir Christopher Wren). When 0·1 inch of rain has fallen, the bucket tips over and causes a wheel to advance one tooth. Attached to the wheel is a helix on which rests the lever carrying the pen which registers each turnover of the bucket. As the clock (the useful invention of MM. Richard frères) turns the paper about ·001 inch per minute, a very clear curve is produced. The approval of the instrument by Mr. Symons is a guarantee of its usefulness, and the cost is much below some other recording gauges.

THE *Journal of the Royal Microscopical Society* for April contains the President's annual address, which is chiefly devoted to the subject of dispersion; the description of a microscope with new focussing mechanism, by Mr. Keith Lucas; and notes on colour-illumination, with special reference to the choice of suitable colours, by Mr. Julius Rheinberg. Among the notes on microscopy is a contribution to the President's interesting article on the evolution of the microscope, and a description of Powell's iron microscope made in 1838–40. In the same number is a table of the conversion of British and metric measures, computed by Mr. E. M. Nelson from the new coefficient obtained by order of the Board of Trade in 1896.

Wiedemann's Annalen der Physik und Chemie, No. 3.—Behaviour of unpolarisable electrodes towards alternate currents, by E. Warburg. If polarisation is altogether due to the solution of the electrode metal in the liquid and its attendant changes of concentration, the "capacity of polarisation" must be inversely proportional to the square root of the frequency. This applies to the case of silver electrodes in silver nitrate solution, and, to a certain extent, to platinised platinum electrodes in saturated NaCl solution.—Methods of studying slow electric oscillations, by W. König. The author describes several new methods of recording and studying electric oscillations of a frequency comparable with that of ordinary sound-waves. One of these consists in discharging them through a rod provided with a short piece of straw at the end on to a metallic plate covered with asphalt varnish. The sparks produce on the plate something resembling Lichtenberg's figures. The plate is attached to a pendulum, and is drawn across the point. On sprinkling the plate with a mixture of sulphur and red lead a series of red and yellow patches appears, which in connection with the known speed of the pendulum gives the frequency of the sparks. The straw may also be attached to the vibrating prong of a tuning-fork, and so a more direct measurement obtained. The straw is necessary to reduce the intensity of the spark, so as to obtain a sharp line.—A new method of exhibiting electric wire waves, by W. D. Coolidge. The author obtains a glow of the wires of a Lecher wire system at the ventral segments of the stationary waves in the open air by using a Blondlot exciter worked with an induction coil and Tesla transformer, and reducing the thickness of the wire to 0·1 mm.—Alternate-current energy consumed in vacuum tubes, by H. Ebert. Very high frequencies were employed, such as 22,000 oscillations per minute. It was found that at a certain high exhaustion the consumption of energy for a given luminous effect attained a minimum. The pressure at which this takes place is inversely proportional to the mean free path of the gaseous molecules.—Absolute determination of thermal radiation by means of the electric compensating pyrheliometer, by K. Ångström. Of two equal blackened strips of metal, one is exposed to the radiation while the other is brought to the same temperature by means of an electric current. The latter furnishes a measure of the radiation.—Measurement of flame temperatures by means of thermo-couples, by F. Berkenbusch. Two new methods devised by Nernst are tested.—Pressure of saturated water vapour below 0°, by M. Thiesen. The author calculates the vapour pressures over ice and over water respectively down to - 80°.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, April 21.—Mr. T. H. Blakesley, Vice-President, in the chair.—A mathematical paper on the effect of a solid conducting sphere in a variable magnetic field on the magnetic induction at a point outside, was read by Mr. C. S. Whitehead. It is an investigation of the magnetic induction at a point outside a solid conducting sphere when magnetic disturbances are taking place in the dielectric envelope. An expression is given for the maximum value of the magnetic induction when the sphere becomes an infinite plate and the inducing system consists of an alternating current in a circular circuit whose plane is parallel to the plate, *i.e.* when the maximum value of the induction tangential to the surface is zero. A second expression gives the maximum value of the magnetic induction normal to the surface for a point at considerable distance from the axis, and just outside the plate. In this latter case, the maximum value of the induction tangential to the surface appears as a function of the maximum current of known frequency in the inducing circuit, the various dimensions in space of the system, and the permeability and specific resistance of the plate. From these equations, taking the most authentic values of the involved constants, the maximum magnetic induction normal to the surface for a sea-water plate is forty-four times as great as it would be for an iron plate, and more than three thousand times as great as it would be for a copper plate. The paper also shows that, for the purpose of induction telegraphy, to get the best effect the receiving coil should have its plane vertical, not horizontal, firstly because the distance of the inducing circuit from the surface of the plate must in practice be small compared with the distance of the point from the axis, so that the maximum normal induction is small compared with the maximum tangential induction; and secondly because the maximum *normal* induction varies inversely as the *fifth* power of the distance of the point from the axis, whereas the maximum tangential induction varies inversely as the fourth power of that distance. In conclusion, Mr. Whitehead applies his formulæ to the practical case mentioned by Prof. Lodge in the *Journal* of the Institute of Electrical Engineers, February 1899, p. 805. Prof. Lodge there describes a horizontal receiving circuit, and states that, with no condensers in the circuit he "was not usually able to hear anything" in the telephone. Mr. Whitehead calculates that under such conditions the theoretical value of the current in Prof. Lodge's horizontal secondary is 0·066 *micro*-amperes, but that with a vertical circuit the received current would have been 33 *milli*-amperes. Mr. Blakesley observed that as a rule experiment preceded theory. He congratulated Mr. Whitehead upon having settled from theoretical considerations that the vertical position of the receiving coil is best. Prof. Everett said that the very elaborate method of analysis adopted in the paper appeared to be very clearly stated. He would like to know whether the inducing coil ought to be vertical as well as the receiving coil. Mr. Appleyard thought that experiment had left no doubt as to the best position of both coils. The early investigations of Mr. Willoughby Smith and the later work of Mr. H. R. Kempe and Mr. Preece had proved that for the best effect both coils should be vertical. But large vertical coils were difficult to fix and expensive to maintain. It was this reason probably that led Prof. Lodge to try what could be done with coils placed horizontally. Mr. Whitehead, in reply, said that his formulæ only applied to a horizontal inducing coil. He had not worked out the case of what would happen if the inducing coil itself was vertical. In the experiments on the Flat Holm both circuits were straight wires with their ends to earth, so that they really amounted to vertical coils.—Mr. R. A. Lehfeldt then gave a demonstration of a method due to Prof. T. W. Richards for standardising thermometers. This depends upon the ordinary latent-heat principle for maintaining constant temperature, but it includes the consideration of generally more than two states or phases of the melting substance. If there are c components and p phases, then the number of degrees of freedom of the system is $[c + 2 - p]$. When this is zero, the temperature and the pressure of the system are perfectly definite. Thus the following chemical formula represents the four phases to be equilibrated in the case of Glauber's salt:

$$\left\{\begin{array}{l}\mathrm{Na_2SO_4 10H_2O}\\ \mathrm{Na_2SO_4}\\ \text{Solution}\\ \text{Vapour.}\end{array}\right.$$

Prof. Richards has determined the temperature of equilibrium in several useful cases. The salts are put into a test-tube in an air-bath formed between it and a second test-tube; the whole is then heated in a beaker of water over a small flame. If the salt is pure, and care is taken to avoid the effect of supersaturation, this method is highly satisfactory. It gives an extensive range of fixed-points, and is especially useful in thermometry for fixed-points between 0° and 100°. A few of these temperatures may be noted:

	° C
Sodium chromate	19·71
Sodium carbonate	53·3
Sodium thiosulphate	48·0
Sodium bromide	50·8
Manganese chloride	57·8
Trisodium phosphate	73·4
Barium hydroxide	78·0

Mr. J. A. Harker asked how long the temperature remained constant. The special value of Richards' method for standardising thermometers of short range had been pointed out by Dr. Chree. It obviated the necessity for auxiliary bulbs, and it would be extremely useful in graduating meteorological thermometers. Mr. Blakesley said that sodium chromate was represented by a very useful temperature. Could this substance be regarded as sufficiently stable to give a satisfactory fixed-point. Mr. Lehfeldt, in reply, said that all the fixed-points mentioned were theoretically as definite as that corresponding to sodium sulphate, but they had not been so accurately determined.

Geological Society, April 12.—W. Whitaker, F.R.S. President, in the chair.—Mr. A. M. Davies, in exhibiting a specimen of glauconitic limestone from the Kimeridge clay, said that it might easily be taken for upper greensand. There are traces of fossils in the stone, but an impression of a *biplex* ammonite was alone recognisable. No similar bed had been previously recorded from the English Kimeridgian.—Fossils in the University Museum, Oxford: (1) Silurian echinoidea and ophiuroidea, by Prof. W. J. Sollas, F.R.S. Attention is called to the correlation of structure and function in the locomotive organs of asterids, ophiurids, and echinids.—Note on the occurrence of sponge-spicules in the carboniferous limestone of Derbyshire, by Prof. W. J. Sollas, F.R.S. Remains of sponge-spicules are fairly abundant in a rock-slice taken from a specimen obtained by Mr. H. H. Arnold-Bemrose from Tissington cutting. They present themselves as sections through long cylindrical rods, but the terminations are obscure and indefinite, and the form cannot be referred with certainty to any recognised order of sponges. The spicules were doubtless originally siliceous, but they are now completely transformed into carbonate of lime.—On spinel and forsterite from the Glenelg limestone, by C. T. Clough and Dr. W. Pollard; communicated by permission of the Director-General of H.M. Geological Survey. The paper opens with an account of previous literature on the subject of minerals in the Glenelg limestone. Neither forsterite nor true spinel has been previously recorded from the limestone or from Scotland at all. The forsterite and spinel are in part associated together in lumps, from which they were separated by means of heavy solutions for analysis. The spinel in hand-specimens is of an almost opaque blue colour, and some examples show small crystal-faces. That seen in microscopic slides is shapeless and colourless, except that the blue portions appear brown by transmitted light. Analyses of the two minerals are given at the close of the paper; and it is pointed out that the spinel is like that of Aker in colour and mode of occurrence.

Mineralogical Society, April 11.—Mr. R. H. Scott, Past-President, in the chair.—Mr. F. R. Mallet gave the results of the examination of a mineral obtained many years ago from the Mayo salt mines, Punjab; he proves it to be Langbeinite, sulphate of potassium and magnesium ($K_2SO_4.2MgSO_4$), a species first established in 1891 from material found in the Prussian salt deposits.—Mr. L. Fletcher gave an account of a mass of meteoric iron from Patagonia, a fragment of which had been brought to this country by Dr. F. P. Moreno of La Plata; the material contains nearly 10 per cent. of nickel and cobalt, and belongs to the class of octahedral meteoric irons, like that of Toluca.—Mr. G. F. H. Smith read a paper on the use and advantages of a three-circle goniometer. The older form of goniometer with one circle has the grave disadvantage that the crystal must be re-adjusted for different zones. In the case of the theodolite goniometer with two circles, the crystal is adjusted once for all, and measurements are made of the polar distance and azimuthal angle of each face; but by this method no use can be made of the law known as the anharmonic ratio of four poles in a zone, and in fact the indices of faces are not readily determinable. By adding a third circle, the advantages of both methods may be combined. The crystal is adjusted once for all, and measurements may be made in any zone at will. One circle gives the angle in this zone, the second the angle this zone makes with a fixed zone, and the third the pole in which this zone intersects the fixed zone. A short description was given of the apparatus necessary to convert an ordinary goniometer into the three-circle form, which is now under construction by Messrs. Troughton and Simms.

Royal Meteorological Society, April 19.—Mr. F. C. Bayard, President, in the chair.—Mr. H. Mellish read a paper on soil temperature, in which he discussed the observations from the thermometers at various depths in the soil which have been made at the stations of the Royal Meteorological Society. These records have been carried on at many of the stations since 1881, and observations have been made at the following depths in the soil: 3 inches, 6 inches, 1 foot, 2 feet, and 4 feet. It appears that in nearly all cases the annual temperature of the soil at the depth of 1 foot is slightly higher than that of the air. In winter time the air and the soil at 1 foot have about the same temperature, the soil being often a little warmer till about the end of January, after which, for the next two months, the air has a small advantage; but in the summer months the soil at 1 foot is generally warmer than the air, the difference exceeding 3° at several stations. Mr. Mellish shows that on the mean for the year the light soils are 1°·0 warmer than the air, while the strong ones are only 0°·2 warmer; and he is of opinion that near the surface we may expect to find wider extremes of temperature in light soils than in strong ones; but that the heavier soils are better conductors of heat, and that consequently the extremes are propagated to greater depths in heavy soils than in light ones.—A paper on some phenomena connected with the vertical circulation of our atmosphere, by Major-General H. Schaw, C.B., R.E., was read by the Secretary. The author has for some time past been studying the circulation of the atmosphere over Australasia, and in this paper gives the results of his examination of the weather charts, chiefly in regard to the interaction of cyclones and anticyclones upon each other.

PARIS.

Academy of Sciences, April 17.—M. van Tieghem in the chair.—On the transformation of surfaces of total constant curvature, by M. Gaston Darboux.—New researches on the heats of formation and combustion of several nitrogen compounds, by MM. Berthelot and G. André. Determinations are given for cholesterine, glycollic and lactic nitriles, xanthine, paraphenylene-diamine, nicotine, pyrrol, carbazol, indol, scatol, oxindol, and α-methylindole.—On the applications of aluminium, by M. A. Ditte. A reply to some observations of M. Moissan on the same subject.—Remarks by M. Berthelot on his work "Animal Heat."—Observations on the planet E L Coggia made at the Observatory of Toulouse with the Brunner equatorial of 23 cm. aperture, by M. F. Rossard.—On some ancient showers of shooting-stars, by M. D. Eginitis.—On the periodic integrals of linear partial differential equations of the first order, by M. Levi-Civita.—Extension of the theorem of the mean to differential equations of the first order, by M. Michel Petrovitch.—On the theory of fundamental functions, by M. W. Stekloff.—Improvements in the electrolytic interrupter of Wehnelt, by M. J. Carpentier. By carefully insulating thermally the electrolytic cell, the temperature is allowed to rise from 80° to 100° C.; as the temperature rises, a smaller voltage is required in the primary circuit. If the length of platinum wire exposed is capable of adjustment, more control is obtained over the working of the coil.—Contribution to the study of the Wehnelt interrupter, by M. H. Armagnat.—On the decomposition of a high potential current into a series of disruptive discharges, by M. H. Abraham.—A cathodic rectifier for induced currents, by M. P. Villard. A Crookes' tube has one bulb of 400 cc. capacity, carrying a large wire spiral as electrode, the other electrode being very small, a few millimetres only in diameter, placed in a narrow tube which is slightly contracted just in front of the disc. This tube, when connected to an induction coil round the primary of which an alternating current is passing, allows only one alternation of the two induced currents to pass, thus acting as a rectifier.—On silver suboxide, by M. Guntz. When Ag_2O is heated in a strong sealed tube at 358°, there is a certain equilibrium (about 49 atmospheres) corresponding to the dissociation tension of Ag_4O. That this pressure corresponds to the suboxide was shown by the following experiment. Into a glass tube of known volume is placed sufficient $KMnO_4$ to give off at 358° oxygen at a pressure just above 50 atmospheres, and two glass tubes containing known weights of silver and silver oxide respectively; and the whole is heated for three days to 358° C. Analysis of the products showed that the Ag_2O had lost weight and the silver had gained weight, and that the gain and loss corresponded exactly in both cases to the formation of Ag_4O.—On the solubility of the normal acids of the oxalic series in water, by M. F. Lamouroux. The acids of the oxalic series, both of odd and even numbers of carbon atoms, are in general slightly soluble in water, the only exceptions being malonic and glutaric acids, which are very soluble.—On the solubility in water of the substituted malonic acids, by MM. G. Massol and F. Lamouroux. Various mono- and di- substituted malonic acids were examined up to acids containing eight atoms of carbon, but no regularities could be deduced.—Action of ethyl, isobutyl, and isoamyl alcohols upon their sodium derivatives, by M. Guerbet. By heating pure inactive amyl alcohol at 150°-160° with its sodium derivative, a new alcohol, diamyl alcohol, $C_{10}H_{22}O$ was obtained, from which various derivatives were obtained, including the chloride, acetate, isovalerate, and benzoate. Bisulphate of potassium gave a hydrocarbon $C_{10}H_{20}$, and oxidation with chromic acid a new acid $C_{10}H_{20}O_2$. Ethyl alcohol studied in a similar fashion, gave at 210° hydrogen and ethylene, but no product corresponding to the diamyl alcohol.—Action of very dilute acids upon the phosphates of the soil, by M. Th. Schlœsing, jun.—On a simple measuring apparatus for use in stereoscopy, the stereometer, by MM. T. Marie and H. Ribaut.—General considerations on the defensive glands in the Coleoptera, by M. L. Bordas.—On the Trias of the neighbourhood of Rougiers (Var), and on the existence in this region of phenomena analogous to the peperites of Auvergne, by M. J. Repelin.—On the origin of the siliceous and quartose grains found in chalk, by M. Stanislas Meunier.

AMSTERDAM.

Royal Academy of Sciences, February 24.—Prof. Van de Sande Bakhuyzen in the chair.—Prof. Schoute reported, in the name of Prof. Korteweg and himself, upon a paper of Mr. S. L. van Oss, entitled "Das regelmässige Sechshundertzell und seine sellstdeckenden Bewegungen." The paper will be published in the Academy's *Transactions*.—Prof. Jan de Vries, on orthoptic circles belonging to linear systems of conic sections.—Prof. Bakhuis Roozeboom, on solubility and melting point as criteria for the distinction of racemic compounds, partially racemic compounds, pseudoracemic mixture crystals and inactive conglomerates.—Prof. Schoute, on a geometric interpretation of the generalisation of Sylvester's catalecticant.—The above three communications will be inserted in the report of the meeting.—Prof. Haga made, both on behalf of himself and Dr. C. H. Wind, a communication on the diffraction of Röntgen rays. Diffraction of X-rays was proved by an experiment arranged as follows: The Röntgen-tube was placed behind a slit 1 c.m. high and 14 microns wide, at 75 c.m. from the latter was the diffraction slit, which gradually diminished in width from 17 to about 2 microns. The photographic plate was placed at 75 c.m. from the diffraction slit. Time of exposure from 100 to 200 hours. The image of the slit first became narrower, and then showed an unmistakable broadening. From the width of the part of the diffraction slit, corresponding to this broadening and the character of the broadening, an estimation can be made of the wave-length. It appeared that X-rays exist of about 0·1 to 2½ Ångström-units, comprising four octaves.—A detailed paper will appear in the report of the next meeting.—Prof. Stokvis presented for publication in the *Proceedings* a short account of experiments, made by Dr. G. Bellaar Spruyt in his laboratory, on the physiological action of methylnitramine. From these experiments it appears that the nitramines show no nitrite actions whatever in the animal organism, and that, consequently, as homologous chemical structure necessarily brings with it homologous physiological action, in accordance with Franchimont's view, they must be considered substances in which nitrogen is most probably cyclically combined.—The following papers were presented for publication in the *Proceedings*:—Two communications by Prof. Lorentz (*a*) on a simplified theory of the electrical and optical phenomena in moving bodies (*b*) Stokes's aberration theory presupposing an ether of unequal density. Two communications by Dr. J. Verschaffelt, presented by Prof. Kamerlingh Onnes, and entitled (*a*) measurements on the course of the isotherms in the proximity of the plait point, and specially on the course of the retrograde condensation in the case of a mixture of carbonic acid and hydrogen (continuation); and (*b*) measurements on the variations of pressure on one component, being substituted for another in mixtures of carbonic acid and hydrogen. A paper by Dr. Ernst Cohen, presented by Prof. Bakhuis Roozeboom, and entitled, "On electrical reaction velocity." A communication by Prof. Franchimont, concerning the dissertation of Mr. L. T. C. Schey, presented to the library of the Academy, and entitled "On neutral glycerine esters (triacylines) from saturated monobasic acids with an even number of C-atoms." The dissertation gives an account of the preparation of the following substances, all of which were obtained by heating the acid with glycerine in a space filled with rarified air, and with a slight current of air:—Tributyrine, tricaproine, tricapryline, tricaprine, trilaurine, trimyristine, tripalmitine, and tristearine. The first three are liquids, the others solids. The density, the index of refraction, and the melting-point of each of them, were determined. The melting-point of tricaprine is the same as that of caprine acid; the melting-points of the lower terms of the acylines are below those of the corresponding acids, those of the higher terms are higher.—This work will be published in the "Recueil des Travaux chimiques des Pays-Bas et de la Belgique."

DIARY OF SOCIETIES.

THURSDAY, April 27.

Royal Society, at 4.30.—Data for the Problem of Evolution in Man. I. A First Study of the Variability and Correlation of the Hand: Miss Whiteley and Prof. Karl Pearson, F.R.S.—The Luminosity of the Rare Earths when Heated *in vacuo* by means of Cathode Rays: A. A. C. Swinton.—On a Quartz Thread Gravity Balance: R. Threlfall and J. A. Pollock.—On the Electrical Conductivity of Flames containing Salt Vapours: H. A. Wilson.—On a Self-recovering Coherer and the Study of the Cohering Action of Different Metals: Prof. J. C. Bose.—On the Presence of Oxygen in the Atmospheres of certain Fixed Stars: Dr. Gill, F.R.S.

Royal Institution, at 3.—The Atmosphere Prof. J. Dewar, F.R.S.

Institution of Electrical Engineers, at 8.—Experiments on Alternate Current Arcs by Aid of Oscillographs: W. Duddell and E. W. Marchant. (Conclusion of Discussion.)—Capacity Measurements of Long Submarine Cables: J. Elton Young.

Institution of Mechanical Engineers, at 7.30.—Address by the President, Sir William H. White, K.C.B., F.R.S.

FRIDAY, April 28.

Royal Institution, at 9.—Some Features of the Electric Induction Motor: Prof. C. A. Carus Wilson.

Institution of Mechanical Engineers, at 7.30.—Evaporative Condensers: Harry G. V. Oldham.

MONDAY, May 1

Society of Arts, at 8.—Leather Manufacture: Prof. H. R. Proctor.

Victoria Institute, at 4.30.—Nationality: Prof. T. McK. Hughes, F.R.S.

TUESDAY, May 2.

Royal Institution, at 3.—Electric Eddy-Currents: Prof. S. P. Thompson, F.R.S.

Zoological Society, at 8.30.—Sur le Type Primitif des Molaires Plexodontes des Mammifères: Dr. F. Ameghino.—Notes on Chinese Mammals, principally from the Western Province of Sechuen: W. E. de Winton.—On a Collection of Land-Shells from British Central Africa: Edgar A. Smith.

WEDNESDAY, May 3.

Society of Arts, at 8.—Ætheric Telegraphy: W. H. Preece, C.B., F.R.S.

Society of Public Analysts, at 8.—On some Comparative Analyses of, and Digestive Experiments with White and Whole Meal Breads: Dr. Otto Rosenheim and Dr. Phillip Schidrowitz.—The Assay of Belladonna, B.P.: F. C. J. Bird.—On the Use of Boric Acid and Formaldehyde as Milk Preservatives: Dr. S. Rideal and G. R. Foulerton.—The Value of the Estimation of Pentosans in Food Materials: Otto Hehner and W. P. Skertchly.

Entomological Society, at 8.

THURSDAY, May 4.

Royal Society, at 4.30.—*Onygena equina* (Willd.): a Horn-destroying Fungus: Prof. Marshall Ward, F.R.S.—Impact with a Liquid Surface studied by the Aid of Instantaneous Photography. Paper II.: Prof. Worthington, F.R.S., and R. C. Cole.—The External Features in the Development of *Lepidosiren paradoxa* (Fitz.): J. G. Kerr.—An Observation on Inheritance in Parthenogenesis: Dr. E. Warren.—The Thermal Expansion of Pure Nickel and Cobalt: A. E. Tutton.

Linnean Society, at 8.—The Position of Anomalurus as indicated by its Myology: F. G. Parsons.—On *Notheia anomala*, Harv. et Bail.: Miss Ethel S. Barton.—On Variation in the Desmidiæ: G. S. West.

Chemical Society, at 8.—On the Combustion of Carbon Disulphide: H. B. Dixon and F. J. Russell.—The Action of Nitric Oxide on Nitrogen Peroxide: H. B. Dixon and J. D. Peterkin.—On the Mode of Burning of Carbon: H. B. Dixon.—Crystalline Glycollic Aldehyde: Henry J. Horstman Fenton and Henry Jackson.—On the Blue Salt of Fehling's Solution and other Cupro-tartrates: Orme Masson and B. D. Steele.—The Preparation of Acid Phenolic Salts of Dibasic Acids: Dr. S. B. Schryver.—The Maximum Pressure of Napthalene Vapour: R. W. Allen.

Institution of Electrical Engineers, at 8.—Electric Locomotives in Practice and Tractive Resistance in Tunnels, with Notes on Electric Locomotive Design: G. V. McMahon.

FRIDAY, May 5.

Royal Institution, at 9.—Pictures produced on Photographic Plates in the Dark: Dr. W. J. Russell, F.R.S.

Geologists' Association, at 8.—The Drainage of Cuestas: Prof. W. M. Davis.

SATURDAY, May 6.

Geologists' Association.—Excursion to the Thame District. Director: A. M. Davies. Leave Paddington at 9.50.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Books.—Statesman's Year-Book, 1899 (Macmillan).—The Arithmetic of Chemistry: Dr. J. Waddell (Macmillan).—How to Know the Ferns: F. T. Parsons (New York, Scribner).—Premiers Principes d'Electricité Industrielle: P. Janet, trois. édition (Paris, Gauthier-Villars).—Royal University of Ireland, Calendar, 1899 (Dublin, Thom).—The Spirit of Organic Chemistry: Prof. A. Lachman (Macmillan).—A Course of Practical Chemistry: M. M. P. Muir, Part 2 (Longmans).—Plato and Darwin: The Abbé M. Hébert, translated by Hon. W. Gibson (Longmans).—Cape of Good Hope, Department of Agriculture, Annual Report of the Geological Commission, 1897 (Cape Town).

Pamphlets.—Field Columbian Museum, Annual Report, 1897–98 (Chicago).—Tre Nebulose fotografate recentemente alla Specola Vaticana: P. G. Lais (Roma).

Serials.—Scientia, Nos. 1 to 3 (Paris, Carré).—Journal of the Franklin Institute, April (Philadelphia)—Zoologist, April (West).—Journal of Anatomy and Physiology, April (Griffin).—Bulletin de la Classe des Sciences, 1899, Nos. 1 and 2 (Bruxelles).—Journal of the Institution of Electrical Engineers, April (Spon).—Among British Birds in their Nesting Haunts: O. A. J. Lee, Part xiv. (Edinburgh, Douglas).—Journal of the Sanitary Institute, April (London).—Jahrbuch der K. K. Geologischen Reichsanstalt, xlviii. Band, 2 Heft (Wien).—Quarterly Review, April (Murray).—Journal of the Chemical Society, April (Gurney).

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